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Appl. No. 09/669,946
Amendment dated January 19, 2004
Reply to Office Action of October 20, 2003

REMARKS/ARGUMENTS

Reconsideration of the present application, as amended, is respectfully requested.

The October 20, 2003 Office Action and the Examiner's comments have been carefully considered. In response, claims are amended, and remarks are set forth below in a sincere effort to place the present application in form for allowance. The amendments are supported by the application as originally filed. Therefore, no new matter is added.

CLAIM AMENDMENTS

Even though the claims were not rejected under 35 USC 112, the claims are amended to be in better form for consideration by the Examiner, to place the claims in better form for allowance, and to more clearly comply with the requirements of 35 USC 112. The claim amendments are not related to the patentability of the claimed invention.

ELECTION/RESTRICTION

The Examiner's indication that claim 48 was inadvertently grouped with Species (B1) and is withdrawn from further consideration is acknowledged.

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PRIOR ART REJECTIONS

In the Office Action, claims 1, 5, 7, 12-13, 17, 22-23, 28, and 32-33 are rejected under 35 USC 102(e) as being anticipated by USP 6,507,380 (Iijima). Claim 34 is rejected under 35 USC 103 as being unpatentable over Iijima. Claims 36-37 are rejected under 35 USC 103 as being unpatentable over Iijima in view of USP 5,578,241 (Hittich) and USP 4,909,601 (Yajima et al.).

The present claimed invention is directed to a liquid crystal display apparatus including a reflection polarizing plate disposed on a front side (observer's side) of a liquid crystal element, which reflects light of one of the two polarized components of incident light which are perpendicular to each other, and which transmits the light of the other polarized component.

With this structure, the reflection polarizing plate, arranged on the front side (observer's side) of the liquid crystal element, absorbs substantially no light and has a high transmittance. Therefore, the light incident on the front side of the liquid crystal element is effectively utilized, so that the intensity of the incident light can be higher and therefore the light that returns to the observer's side is intensified. Thus, the present invention is advantageous in that a bright display can be obtained.

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None of the references of record disclose, teach or suggest the present claimed invention.

USP 6,507,380 (Iijima) discloses that a polarizer (130) is arranged on the front side of a TN liquid crystal (140), and a light scattering layer (150) and a polarized light separator (160) are arranged (in this order) on the back side of the TN liquid crystal (140). Further, a polarizer (170) and a light source (190) are arranged on the back side of the polarized light separator.

Iijima does not disclose, teach or suggest a reflection polarizing plate arranged on the front side of the TN liquid crystal which reflects the light of one of the two polarized components of incident light which are perpendicular to each other and which transmits the light of the other polarized component.

None of the other references of record close the gap between the present claimed invention as defined by independent claim 1 and Iijima.

USP 5,578,241 (Plach et al., incorrectly indicated as Hittich in the Office Action) disclose that liquid crystal cells having twist angles of 80° to 170° are known as TN cells. Plach et al. do not, however, disclose a reflection polarizing plate disposed on the front side of the TN cell which reflects the

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light of one of the two polarized components of the incident light which are perpendicular to each other, and which transmits the light of the other polarized component.

USP 4,909,601 (Yajima et al.) discloses that a TN liquid crystal material has a double refraction ratio Δn , which is set to a value that allows a high-contrast display by transmitted light of three primary colors. Yajima et al. do not, however, disclose a reflection polarizing plate disposed on the front side of the TN cell which reflects the light of one of the two polarized components of the incident light perpendicular to each other and transmits the light of the other polarized component.

USP 6,359,670 (Broer et al.) discloses a liquid crystal display element, in which a reflective polarizer (9) including a cholesteric mirror (12) and a $\lambda/4$ plate (13) is arranged on the back side of a display cell (1). Broer et al. further teach a liquid crystal display element having a lighting device.

USP 5,856,855 (Moi et al.) discloses a display apparatus in which an illumination system (3), including an optical waveguide (9) and a reflective polarizer (21) on the back side of the optical waveguide, is arranged on the back side of a display panel (5).

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USP 5,561,539 (Funahata et al.) discloses a liquid crystal element in which a liquid crystal layer is sandwiched between two polarizing plates (111, 112).

The present claimed invention as set forth in claim 1 recites that a reflection polarizing plate disposed on a front side (observer's side) of a liquid crystal element reflects light of one of the two polarized components of the incident light, which are perpendicular to each other, and transmits the light of the other polarized component (see claim 1, lines 11-16).

In contrast to the present claimed invention, in Iijima as stated above, the polarizer (130) is arranged on the front side of the TN liquid crystal (140), and the light scattering layer (150) and the polarized light separator (160) are arranged (in this order) on the back side of the TN liquid crystal (140).

More specifically, Iijima, at column 10, lines 58-60, states: "[a]bove the TN liquid crystal 140, a polarizer 130 is provided as an example of the first polarized light separating means." In Iijima, only the polarizer (130) is explicitly described as polarized light separating means located on the front side of the TN liquid crystal (140). The polarizer (130) separates light into two straight polarized light components perpendicular to each other, transmits one of the two and absorbs the other. In this respect, Iijima may teach the polarizer (130)

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as the first polarized light separating means. However, Iijima does not disclose, teach or suggest that a reflection polarizing plate, disposed on the front side of the liquid crystal element reflects the light of one of the two polarized components of the incident light perpendicular to each other and transmits the light of the other polarized component, is used as the polarized light separating means.

Moreover, according to the present claimed invention, the reflection polarizing plate, which absorbs substantially no light and has a high transmittance, is arranged on the front side (observer's side) of the liquid crystal element. Therefore, the light incident on the front side of the liquid crystal element is effectively utilized, so that the intensity of the incident light can be higher and therefore the light that returns to the observer's side can also be intensified. Thus, the present invention recited in claim 1 is clearly patentably different from Iijima.

As indicated above, none of the other references of record close the gap between the present claimed invention as defined by claim 1 and Iijima. Therefore, the present claimed invention as defined by claim 1 is patentable over Iijima and the other references of record when taken either alone under 35 USC 102 or in combination under 35 USC 103.

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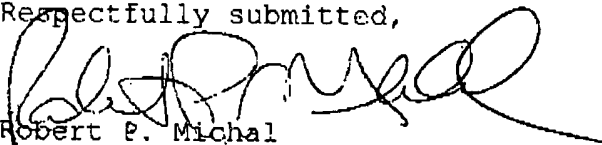
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Entry of this Amendment, allowance of the claims and the passing of this application to issue are respectfully solicited.

If the Examiner disagrees with any of the foregoing, the Examiner is respectfully requested to point out where there is support for a contrary view.

If the Examiner has any comments, questions, objections or recommendations, the Examiner is invited to telephone the undersigned at the telephone number given below for prompt action.

Respectfully submitted,



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